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### Ohio State Engineer

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# Do We Have Enough of the Essential Metals?

JAMES W. RICKLES

Prior to the entrance of the United States into World War II, economic, industrial, and military experts were well aware of the fact that there would be difficulty in supplying the necessary essential raw materials for civilian as well as military use. Huge quantities of certain vital metals were stored for possible military emergencies. In the majority of cases, however, the sources of these essential metals were cut off from us before the accumulations were completed. In the following paragraphs, the plans of the government for supplying these required materials will be presented.

## Steel

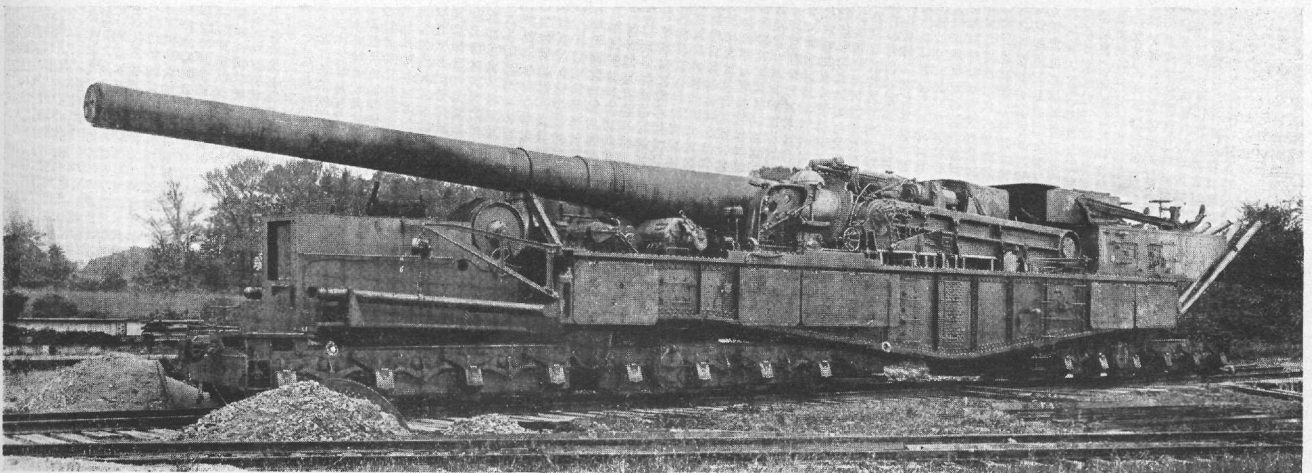
More steel became the demand of the nation when the treacherous attack on Pearl Harbor plunged us into war. And still more steel was necessary to supply the war program of a country determined to deliver too much too soon instead of too little too late. The steel industry has been faced with the problem of equipping a potential army of seven million men, including at least nine armored divisions and a blueprint air force of fifty thousand planes. It has to build a two-ocean navy of some six million gross tons. Naval bases from Newfoundland to Trinidad to Alaska are being built and supplied. The lend-lease program to the Allied Nations fighting Nazism is further taxing

the steel industry. Last December, automobile production for civilian use was curtailed, diverting some nine million tons of steel to defense channels. Civilian needs can only be cut so far, however. Steel for plants, farm machinery, railroads, box cars, pipelines, and many other vital things which cannot be classified as direct military needs must be provided.

The elimination of many special-order steels that were formerly made has enabled steel producers to develop routines of high efficiency. Steel consumers in cooperation with the steel companies have been concentrating on the use of a group of 87 alloy steel and 77 carbon steels, selected as standard steels after a two-year period of study and research by plant-operating executives and outstanding metallurgists. Hitherto, carbon and alloy steel have been made in more than four thousand combinations of chemical elements.

Still, there is a great shortage of steel. The importance of iron and steel scrap, which is charged with pig iron in the open hearth furnaces, has been accentuated by its growing scarcity. Large drives for the salvage of this scrap are operating in cities and towns all over the country. The plants and mines are carefully canvassed for the scrap, and collections are made at frequent intervals. Oil and grease drums that used to be discarded after

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Courtesy Military Engineer

Wartime metal is used to make railway guns such as this.

One of many new Allis-Chalmers steam turbines which are helping to power the greatest war production effort in history.

# Bundles for Berlin... Power for Pittsburgh!

ALLIS-CHALMERS  
EQUIPMENT HELPS  
MAKE BOTH

Ore for Giant Aerial Torpedoes and bombs is mined with Allis-Chalmers equipment.

"A. HITLER, BERLIN, GERMANY"  
That's what we'd like to label just one of the thousands of tons of ore which Allis-Chalmers equipment is helping to mine and turn into aerial torpedoes and bombs!

And that turbine above is another Allis-Chalmers product that will soon be turning out trouble for Hitler—supplying power to great war plants—helping to make America's soldiers the best equipped in the world.

These are just two examples of how thou-



# ALLIS-CH

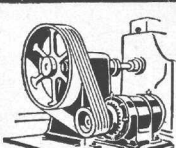
OFFERS EVERY MANUFACTURER EQUIPMENT AND ENGINEERING



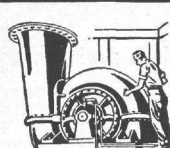
ELECTRICAL  
EQUIPMENT



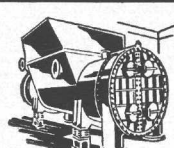
STEAM AND  
HYDRAULIC TURBINES



MOTORS & TEXROPE  
V-BELT DRIVES



BLOWERS AND  
COMPRESSORS

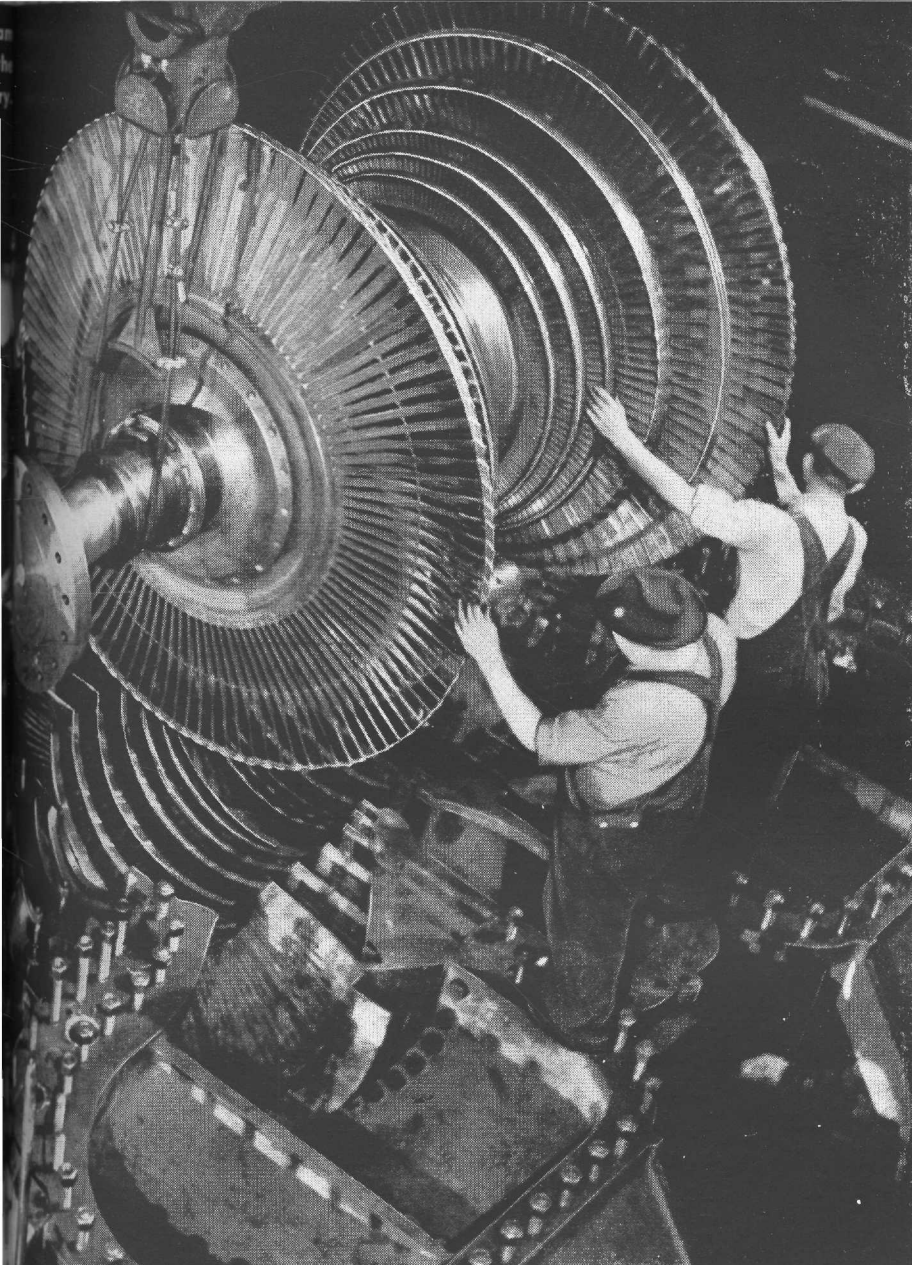


ENGINES AND  
CONDENSERS



CENTRIFUGAL  
PUMPS



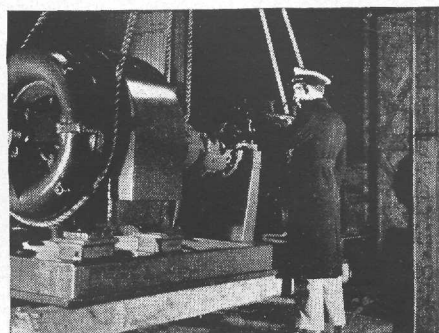


## VICTORY NEWS

Washington, D. C. — Keels for more than 140 "Liberty" ships have been laid and more than 60 ships have been launched from ways which did not even exist before 1941. Original schedules have already been more than doubled.

To set the fastest shipbuilding record in history, mass production principles are used. More than 500 makers are feeding parts to Liberty ways.

From Allis-Chalmers, one of the most important of the contributing firms, comes products ranging from machine-gun cooling pumps to propulsion shafting.



Three-Stage High Speed Pump is inspected as it leaves A-C shops for a military destination. Equipment includes Allis-Chalmers motors and switchgear.

Milwaukee, Wis. — Mosquito boats no longer have to use their motors to recharge their batteries—small Allis-Chalmers rectifier units now do this job.

This unit is the newest means of obtaining nominal d.c. current from existing a.c. power lines. It eliminates need for keeping ships motors running for battery charging on shore. It also aids coast defense by helping to supply power for shore searchlights.

Industrial plants are also using the new unit to supply small amounts of d.c. for individual drives on planers and other machines, in laboratories for testing purposes, and in tool rooms.



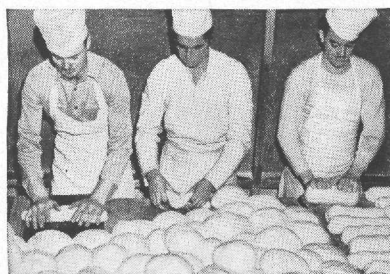
**FOR VICTORY**  
Buy United States War Bonds

sands of Allis-Chalmers people are fighting the Axis—are working for Victory!

Over 1,600 Allis-Chalmers products are working in the Battle of Production. And our Cooperative Engineering service is helping makers produce more—not just with new machines, but with machines now on hand!

This production experience will be of added value when the war is over. We work for Victory—we plan for Peace!

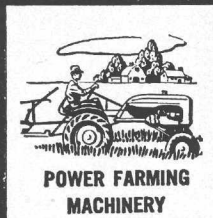
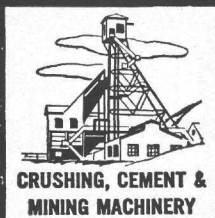
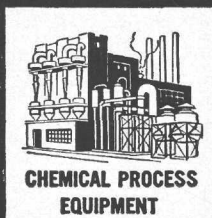
ALLIS-CHALMERS MFG. CO., MILWAUKEE, WIS.



8 out of 10 loaves of bread in U.S. are made with the aid of A-C farm and flour mill equipment.

# ALLIS-CHALMERS

OPERATION TO HELP INCREASE PRODUCTION IN THESE FIELDS...



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## METALS FOR WAR

*(Continued from page 11)*

their contents were removed, are now being returned to suppliers for refilling. Every pound of material saved is equal to a pound of material produced. The importance of saving materials is a regular topic of discussion at company operation meetings, and is being given constant attention by all employees as well.

All blast furnaces and all steel-making furnaces for which iron and steel scrap are available are operated on a 24-hours-a-day, seven-days-a-week basis, subject only to interruptions for repairs and relining. Any reduction in the idle time of these units is that much gain for production. Early this year, one company established what is believed to be a new world's record when it completely relined its blast furnace in 31 days, or some twenty days less than the shortest relining time previously reported. The need for greater output has resulted in bringing back into service some of the older and higher-cost producing equipment which it would not be economical to operate in normal times. Even when it's not practical to operate them, ways are being found to make use of such equipment. Parts of the old machinery are utilized to provide essential parts increasing the capacity

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## METALS

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of other existing furnaces in the district by nearly 400,000 tons of pig iron a year. The use of these parts and auxiliaries, such as blowers and casings, will not only conserve the equipment for other phases of war production, but will also speed up expansions which might otherwise have to await extended deliveries of the materials.

### Aluminum

The drive to save metals is also aimed at tin, aluminum, copper, zinc, magnesium, tungsten, and others. There is not much to say about aluminum—there is not much aluminum. In fact, there is no aluminum for civilian and indirect military needs. Direct military needs (airplanes, battleships, and Army ordnance) may be filled this year with 1,200,000,000 pounds promised. This can be done only if Canada makes good on her promise of 200,000,000 pounds, if we get control of enough scrap, and if estimates are not raised again. If the Douglas bomber, B-19, became a weapon of the future, all estimates would have to be doubled. Sixty per cent of all our bauxite (the chief aluminum ore) comes from South America; therefore, shipping is the major obstacle in the way of our obtaining more of this raw material.

### Copper

A year and a half ago, a shortage in copper seemed unimaginable. However, when requirements hit the two-million-ton mark for this year, our previous output of less than a million tons looked very much like the proverbial drop in the bucket. South America can supply some of this shortage, but our own capacity will have to be doubled.

### Tin

Finally, tin is a problem of the Far East. With Japan in the East Indies, the U. S. cannot import it. However, it is not a military necessity. A shortage of tin for tinplate and solder would nonetheless disrupt a food economy built around the lowly tin can.

So, do we have enough of the essential metals to carry on our war successfully? According to the estimates, it can be done. However, it's going to take the help that every one of you can give. Take part in these scrap metal drives in your neighborhood, and make sure that there is no lack of the vital iron and steel. Let's get in the "scrap." Bibliography—

*The Virginia Tech Engineer, January, 1942.*

*U. S. Steel News, April, 1942.*

*U. S. Steel News, July, 1942.*